USDA-CSREES 2007 National Water Quality Conference

Impacts of Landscape Scale Disturbances on Aquatic and Riparian Ecosystems in the Sugar Creek Waters

The goal of the project is to examine how the structure and function of aquatic food webs in headwater streams are impacted by various land management practices with the aim of enhancing aquatic ecosystem function and water quality in agriculturally impaired watersheds. Sugar Creek in northeast Ohio is the second most degraded watershed in the state, and agriculture is the major source of impairment to stream water quality. During the past six years, a multidisciplinary team of scientists has been working with local farming communities to develop a framework, methodology, and supporting data to improve water quality in the watershed. Our CSREES (2005) project builds upon existing work in the watershed and expands in new directions by addressing the following objectives: (1) Quantify structure and function of the aquatic invertebrate and vertebrate food webs in headwater tributaries representing a range of geographic and land management conditions within the watershed; and (2) Relate the function of aquatic ecosystems to land use characteristics as a framework for headwaters restoration, with emphasis on assessing riparian and cropland impacts on stream biota and ecosystem processes and the efficacy of current BMPs for mitigating these impacts. Preliminary data suggest that fish assemblages were weakly associated with local, instream habitat conditions and more strongly related to watershed hydrology and geomorphology. Other assemblages of organisms, namely macroinvertebrates and salamanders, respond differently to habitat and anthropogenic disturbance, often at different spatial and temporal scales than fishes. We suggest that headwater fish assemblages in highly disturbed landscapes may be weakly associated with instream habitat, and establishing a clear link between forested riparian areas and aquatic biota can be difficult in these types of systems. Understanding habitat in the landscape matrix may be more important than local habitat conditions in the systems we examined.

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